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10 October 1966

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SOVIET SCIENCE AND TECHNOLOGY

AT THE 50-YEAR MARK

In the past, Soviet claims of achievement in S & T have been extravagant, weakly documented, and ambiguous; yet by and large they have been uncontested. Without denying any credit properly due to the Soviets, however, it can be said that:

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a) Soviet S & T yields returns which are small relative to the scale of the effort expended;

b) it has relied heavily on Western know-how (whether acquired overtly or by the RIS) and consequently the Soviets are now less able to provide the research and development necessary for continued technological and economic advances;

c) it is extraordinarily military-oriented;

d) relative to the massive investment in education and employment of scientists and engineers it produces only pitifully small benefits for the consumer.

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Historical background. Having inherited a strong base that had been built up since the Academy of Sciences was founded under the patronage of Peter the Great in 1725, the Soviets continued and accelerated scientific growth and harnessed science to their objective of strengthening the state by means of military and industrial development. Their method has been to force the growth of education in S & T; they gave major emphasis to basic science, perhaps an inadvertent pursuit of the traditional bent of Russian science. The numbers of recent Soviet graduates and advanced degree holders in S & T exceed the numbers in the U.S. but, as discussed below, the effectiveness of S & T in the U.S. is far greater.

Assessment of Soviet S & T. Based on accumulated information from S & T literature, exchanges, international conferences, prize awards, and the visible results of Soviet efforts in the military and space, industrial, and consumer spheres, a fairly accurate picture has been formed of Soviet S & T. On the positive side (as viewed by the Soviets) are:

a) achievements in basic science which, though rated fairly high in some fields, (notably physiology, mathematics, theoretical chemistry, physics, radioastronomy) generally remain at levels clearly below those of the U.S.;

b) a rise in the international prestige of Soviet S & T (partly owing to the Soviets' ability to capitalize on their space program; see below);

c) development and production of large-size military and space hardware (an achievement with some serious drawbacks, inasmuch as the Soviets were unable to reduce the size of their rockets because of their failure to miniaturize certain components); and

d) the achievement of a series of firsts in space (these feats reflect a concerted effort to nose out the U.S. in projects which were being carried out simultaneously in the 2 countries (openly in the U.S.; secretly in the USSR); the scientific contributions of the Soviet space program have, however, been negligible compared to those of the vastly more sophisticated U.S. program).

On the negative side:

a) Soviet S & T absorbs enormous amounts of funds which are burdensome when viewed against the background of the size of the economy and the USSR's obvious, pressing needs for many of the simplest facilities (such as toilets, bathtubs, streets, and electric power lines for home distribution).

b) substantial though unknown amounts of money and the best S & T facilities and brains are siphoned off for research and development (R & D) in support of the military;

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- c) S & T support for heavy industry, though of lower priority than for the military, requires large allocations;
- d) consumer requirements have traditionally been rated a poor third priority both with respect to funds and quality of S & T resources;
- e) Soviet S & T has been conducted under a system of oppressive and often ridiculous secrecy which has hindered internal communications and free inquiry and, during most of the communist era, has kept Soviet scientists from contact with Free World counterparts;
- f) the Soviets have relied upon massive efforts to acquire Free World S & T by means of perusing foreign literature and patents and extracting maximum benefits from international conferences and exchanges, and also (see, i.a., Penkovsky Papers) by long-established, large-scale espionage operations;
- g) the training and employment of Soviet engineers has generally been so specialized that few Soviets are able even to discuss broad engineering problems, much less relate them to economic and social issues;
- h) the organization and management of Soviet non-military S & T is afflicted by a serious imbalance unduly favoring basic over applied science and, in technology, there is duplication and backwardness and the inefficient use of highly trained personnel in technicians' jobs (see attached Soviet articles, especially the one giving Peter Kapitsa's views, on efficiency in science);
- i) Soviet S & T proved unable to support the programs to create modern industries in the USSR for the production of consumer goods (chemical products such as artificial fibers, fertilizers, petrochemicals, plastics; and automobiles) necessitating the import of complete plants and technology from the West;
- j) the CPSU dominates Soviet S & T by exercising over-all control of education and research objectives and by supervising the execution of the state's plans through more than 69,000 primary party organizations in institutes. By so doing, it subjects Soviet S & T to a gigantic bureaucracy and stifles the initiative and responsiveness of individual scientists;
- k) judging from their participation at international conferences, Soviet scientists either (1) have very little to contribute to advances in basic science (which tends to support the belief of Free World scientists that the Soviet government has little first-class equipment such as computers to spare for work that is not military-related) or (2) cannot, for security reasons, say anything about their work when at conferences on subjects that have a bearing on military development;

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1) the numerous Soviet scientists working on classified projects are not identified to the public (except when they die) and have to obtain satisfaction from the prestige they earn within the circle of their colleagues. Witness the nearly complete anonymity of Soviet space scientists (see BPG #994 concerning Luna 9) and the delay of several years in according posthumous public recognition of nuclear physicist I.V. Kurchatov, who was a leader in both the development of the hydrogen bomb and non-military applications of atomic energy.

The net results of the Soviet effort, according to Free World observers, are significant, yet far short of being proportionate to the enormous resources devoted to S & T in the USSR; thus the effort is not a failure but, by Western standards, hardly a success. From the standpoint of the Soviet consumer the returns on his large indirect monetary contributions to S & T are most meager, as witness the limited and misspent funds for R & D in agriculture, consumer goods, and housing. In the industrial effort Soviet S & T has not only failed to provide adequate modern technology for the domestic production of chemicals and automobiles, but it has provided such mediocre technology that low-quality Soviet industrial goods can find no significant outlets in Europe and have to be marketed in less developed countries at cut-rate prices, paid by long-term low-interest loans. Furthermore, largely because of weak S & T support Soviet industry in the last 5 years has suffered damaging reverses in the growth of the productivity of capital goods and labor. Only in the military and space sphere can the Soviets claim that their massive outlays entitle them to prominence; but even these claims are debatable because of the generally less sophisticated Soviet hardware and paucity of new scientific contributions.

Looking to the future of S & T, the Soviets reiterate their well-worn slogan: tomorrow will be better. They have recently announced a major reform of Soviet universities, where future engineering students will no longer be obliged to specialize narrowly but will be exposed to a wider curriculum in science and what is regarded as business school subjects in the U.S. (See Press Comment 26 September 1966 p. 19). Furthermore, in discussing the poor quality (short useful lives; low reliability) of Soviet machinery, TASS on 24 September 1966 promised that more attention will be paid to these problems, especially by applying the very latest achievements of S & T. Free World observers can justifiably feel skeptical about the Soviets' prospects of changing a course that has been so firmly set for so long.

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